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FLOOD INSURANCE STUDY

SENECA COUNTY, OHIO
UNINCORPORATED AREAS

MAY 17, 1990

Federal Emergency Management Agency

COMMUNITY NUMBER - 390779

NOTICE TO
FLOOD INSURANCE STUDY USERS

Communities participating in the National Flood Insurance Program have established repositories of flood hazard data for floodplain management and flood insurance purposes. This Flood Insurance Study may not contain all data available within the repository. It is advisable to contact the community repository for any additional data.

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FLOOD INSURANCE STUDY

SENECA COUNTY,
UNINCORPORATED AREAS,
OHIO

1.0 INTRODUCTION

1.1 Purpose of Study

This Flood Insurance Study investigates the existence and severity of flood hazards in the Unincorporated Areas of Seneca County, Ohio, and aids in the administration of the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973. This study has developed flood risk data for various areas of the community that will be used to establish actuarial flood insurance rates and assist the community in its efforts to promote sound floodplain management. Minimum floodplain management requirements for participation in the National Flood Insurance Program are set forth in the Code of Federal Regulations at 44 CFR, 60.3.

In some states or communities, floodplain management criteria or regulations may exist that are more restrictive or comprehensive than the minimum Federal requirements. In such cases, the more restrictive criteria take precedence and the State (or other jurisdictional agency) will be able to explain them.

1.2 Authority and Acknowledgments

The sources of authority for this Flood Insurance Study are the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973.

The hydrologic and hydraulic analyses for this study were performed by the U.S. Army Corps of Engineers (COE), Buffalo District (the Study Contractor) for the Federal Emergency Management Agency (FEMA), under Inter-Agency Agreement No. EMW-86-E-2226, Project Order No. 16. This study was completed in September 1987.

1.3 Coordination

On October 31, 1985, an initial meeting was held with representatives from FEMA, the Ohio Department of Natural Resources (ODNR), Seneca County, and the Study Contractor. The selection of streams to be studied in detail was determined at this meeting.

On June 6, 1989, the results of this Flood Insurance Study were reviewed and accepted at a final coordination meeting attended by representatives of the Study Contractor, FEMA, and the community.

2.0 AREA STUDIED

2.1 Scope of Study

This Flood Insurance Study covers the unincorporated areas of Seneca County. The [illegible] is shown on the Vicinity Map (Figure 1). The [illegible] were excluded from this study.

Flooding [illegible] Sandusky River was studied in detail.

Areas having [illegible] or potential flood hazards were previously studied using appropriate analyses. The results were shown on the Flood Hazard Boundary Map for Seneca County (Reference 1) and are incorporated into this Flood Insurance Study.

The areas studied were selected with priority given to all known flood hazard areas and areas of projected development or proposed construction through September 1992. The scope and methods of study were proposed to and agreed upon by FEMA and Seneca County.

2.2 Community Description

Seneca County is located in north-central Ohio and is bordered by Huron County on the east, Sandusky County on the north, Wood and Hancock Counties on the west, and Wyandott and Crawford Counties on the south. Seneca County is served by U.S. Routes 23 and 224, State Routes 4, 18, 19, 53, 57, 100, 101, 162, 199, 228, 231, 587, 590, and 635, Conrail, the Norfolk Southern Railway, and the CSX railroad. Seneca County, which is primarily rural, had a reported 1980 population of 61,901 (Reference 2).

Seneca County has a continental climate, which is characterized by moderate extremes of temperature and precipitation. The maximum temperature of 108°F was recorded in September 1953 at the Bucyrus, Ohio, climatological data station; the minimum of -19°F was recorded in December 1963. The maximum 24-hour rainfall was 5.42 inches, recorded on June 20, 1975, and the maximum 24-hour snowfall was 16.0 inches, recorded on March 13, 1913 (Reference 3).

2.3 Principal Flood Problems

Floods have been observed in the Sandusky River watershed for over 100 years. Basin-wide floods have occurred in February 1833, January 1847, February 1883, and January, February, and March 1904. Some of the more significant floods were in March 1913, which had an estimated recurrence interval of 200 years; June 1937 and January-February 1959, both having a 20-year recurrence interval; and January 1980, March 1963, March 1978, and June 1981, each having a recurrence interval of 10 years. No recurrence intervals were estimated for floods prior to 1913 (Reference 4). Ice jams have been known to aggravate the flood stages. Because most of Seneca County is rural, widespread flooding and flooding of long duration on small streams is not a major problem.

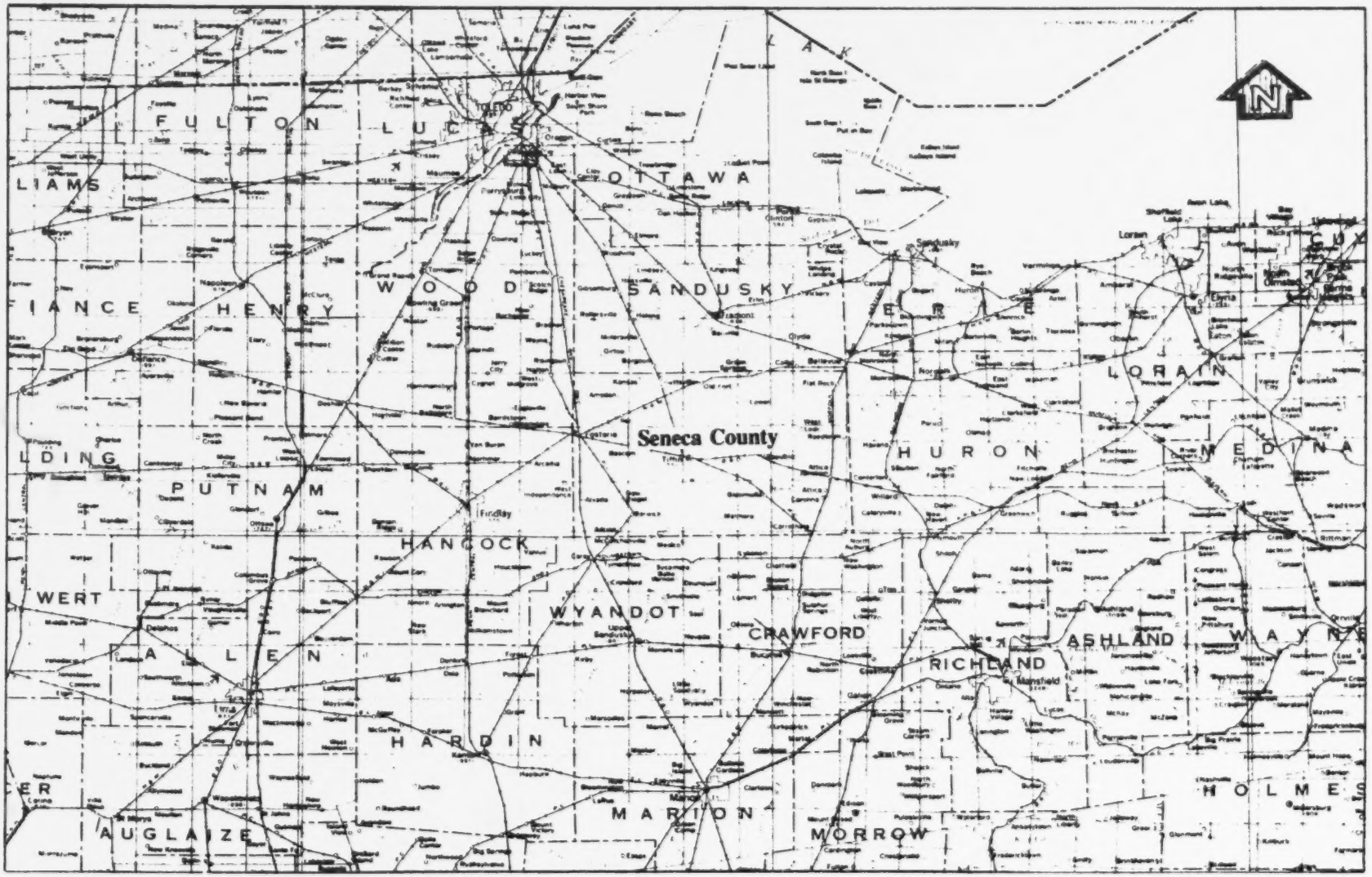


FIGURE 1

FEDERAL EMERGENCY MANAGEMENT AGENCY

SENECA COUNTY, OH
(UNINCORPORATED AREAS)

APPROXIMATE SCALE

16 0 16 32 48 MILES

VICINITY MAP

2.4 Flood Protection Measures

No flood protection measures are known to exist within the study area.

3.0 ENGINEERING METHODS

For the flooding sources studied in detail in the community, standard hydrologic and hydraulic study methods were used to determine the flood hazard data required for this study. Flood events of a magnitude that is expected to be equaled or exceeded once on the average during any 10-, 50-, 100-, or 500-year period (recurrence interval) have been selected as having special significance for floodplain management and for flood insurance rates. These events, commonly termed the 10-, 50-, 100-, and 500-year floods, have a 10-, 2-, 1-, and 0.2-percent chance, respectively, of being equaled or exceeded during any year. Although the recurrence interval represents the long-term average period between floods of a specific magnitude, rare floods could occur at short intervals or even within the same year. The risk of experiencing a rare flood increases when periods greater than 1 year are considered. For example, the risk of having a flood that equals or exceeds the 100-year flood (1-percent chance of annual exceedence) in any 50-year period is approximately 40-percent (4 in 10), and, for any 90-year period, the risk increases to approximately 60-percent (6 in 10). The analyses reported herein reflect flooding potentials based on conditions existing in the community at the time of completion of this study. Maps and flood elevations will be amended periodically to reflect future changes.

3.1 Hydrologic Analyses

Hydrologic analyses were carried out to establish the peak discharge-frequency relationships for each riverine flooding source studied in detail affecting the community.

Data obtained from the USGS gaging station on the Sandusky River located just downstream of the County Route 90 bridge were used to simulate the 100-year peak discharges for each of the study segments according to the criteria outlined in Bulletin 17B (Reference 5).

The 100-year peak discharge for the upstream segment was determined using the discharge-frequency curve at the gage station. The 100-year peak discharge for the other reaches were calculated using a technique developed for the Irondequoit Creek Watershed (Reference 6).

Peak discharge-drainage area relationships for the 100-year flood of the Sandusky River are shown in Table 1.

TABLE 1 - SUMMARY OF DISCHARGES

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (SQ MILES)	PEAK DISCHARGE (CFS) 100-YEAR
SANDUSKY RIVER		
just upstream of Spicer Creek	1,033	33,700
just upstream of Rock Creek	966	31,700
just downstream of County Route 90	774	26,000

3.2 Hydraulic Analyses

Analyses of the hydraulic characteristics of flooding from the sources studied were carried out to provide estimates of the elevations of floods of the selected recurrence intervals.

Cross-section data for the channel and overbank areas were obtained by field survey and topographic maps (References 7 and 8). Bridges were field surveyed and bridge plans were used to obtain elevation data and structural geometry.

Locations of selected cross sections used in the hydraulic analyses are shown on the Flood Profiles and on the Flood Insurance Rate Map.

Roughness coefficients (Manning's "n") used in the hydraulic computations were chosen by engineering judgment and based on field observation of the stream and floodplain areas. Values range from 0.035 to 0.04 for the channel and from 0.06 to 0.1 for the overbank areas. The contraction-loss coefficient ranged between 0.1 and 0.3 and the expansion-loss coefficient ranged between 0.3 and 0.5.

The starting water-surface elevation for the downstream segment was determined by normal-depth calculations. For the middle segment, the starting water-surface elevation was taken from the Flood Insurance Study for the City of Tiffin (Reference 9). For the upstream segment, the starting water-surface elevation was taken from rating curves developed from gage data obtained at the County Route 90 bridge.

Water-surface elevations for the 100-year flood were computed using the HEC-2 step-backwater computer program (Reference 10). Flood profiles were drawn showing the computed water-surface elevations for floods of the selected recurrence intervals.

The hydraulic analyses for this study are based on the effects of unobstructed flow. The flood elevations shown on the profiles are thus considered valid only if hydraulic structures remain unobstructed, operate properly, and do not fail.

All elevations are referenced to the National Geodetic Vertical Datum of 1929 (NGVD). Elevation reference marks used in this study are shown on the map and described in the exhibit labeled Elevation Reference Marks.

4.0 FLOODPLAIN MANAGEMENT APPLICATIONS

The National Flood Insurance Program encourages State and local governments to adopt sound floodplain management programs. Therefore, each Flood Insurance Study provides 100-year flood elevations and delineations of the 100- and 500-year floodplain boundaries and 100-year floodway to assist communities in developing floodplain management measures.

4.1 Floodplain Boundaries

To provide a national standard without regional discrimination, the 1-percent annual chance (100-year) flood has been adopted by FEMA as the base flood for floodplain management purposes. The 0.2-percent annual chance (500-year) flood is employed to indicate additional areas of flood risk in the community. For each stream studied in detail, the 100- and 500-year floodplain boundaries have been delineated using the flood elevations determined at each cross section. Between cross sections, the boundaries were interpolated using topographic maps at scales of 1:2400 and 1:24000 with contour intervals of 2 and 5 feet, respectively (References 7 and 8).

The 100-year floodplain boundaries are shown on the Flood Insurance Rate Map. On this map, the 100-year floodplain boundary corresponds to the boundary of the areas of special flood hazards (Zones A, AE, AH, AO, A99, V, and VE). Small areas within the floodplain boundaries may lie above the flood elevations but cannot be shown due to limitations of the map scale and/or lack of detailed topographic data.

For the streams studied by approximate methods, only the 100-year floodplain boundary was delineated using the Flood Hazard Boundary Map for Seneca County (Reference 1).

4.2 Floodways

Encroachment on floodplains, such as structures and fill, reduces the flood-carrying capacity, increases the flood heights and velocities, and increases flood hazards in areas beyond the encroachment itself. One aspect of floodplain management involves balancing the economic gain from floodplain development against the resulting increase in flood hazard. For purposes of the National Flood Insurance Program, a floodway is used as a tool to assist local communities in this aspect of floodplain management. Under this concept, the area of the 100-year floodplain is divided into a floodway and a floodway fringe. The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 100-year flood can be carried without substantial increases in flood heights. Minimum Federal standards limit such increases to 1.0 foot, provided that hazardous velocities are not produced. The floodways in this study are presented to local agencies as minimum standards that can be

adopted directly or that can be used as a basis for additional floodway studies.

The floodways for this study were computed for certain stream segments on the basis of equal conveyance reduction from each side of the floodplain. Floodway widths were computed at cross sections. Between cross sections, the floodway boundaries were interpolated. The results of the floodway computations are tabulated for selected cross sections and are shown in Table 2, Floodway Data. The computed floodways are shown on the Flood Insurance Rate Map. In cases where the floodway and 100-year floodplain boundaries are either close together or collinear, only the floodway boundary is shown.

Along streams where floodways have not been computed, the community must ensure that the cumulative effect of development in the floodplain will not cause more than 1.0-foot increase in the base flood elevations at any point within the community.

The area between the floodway and the 100-year floodplain boundaries is termed the floodway fringe. The floodway fringe encompasses the portion of the floodplain that could be completely obstructed without increasing the water-surface elevation of the 100-year flood by more than 1.0 foot. Typical relationships between the floodway and the floodway fringe and their significance to floodplain development are shown in Figure 2.

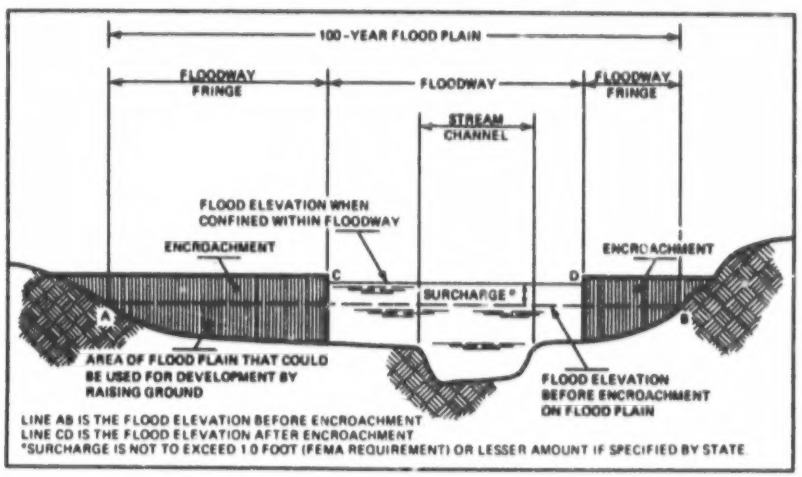

100-YEAR FLOOD PLAIN
FLOODWAY FRINGE
FLOODWAY
FLOODWAY FRINGE
STREAM CHANNEL
FLOOD ELEVATION WHEN CONFINED WITHIN FLOODWAY
ENCROACHMENT
ENCROACHMENT
C
D
SURCHARGE*
A
B
AREA OF FLOOD PLAIN THAT COULD BE USED FOR DEVELOPMENT BY RAISING GROUND
FLOOD ELEVATION BEFORE ENCROACHMENT ON FLOOD PLAIN
LINE AB IS THE FLOOD ELEVATION BEFORE ENCROACHMENT
LINE CD IS THE FLOOD ELEVATION AFTER ENCROACHMENT
*SURCHARGE IS NOT TO EXCEED 1.0 FOOT (FEMA REQUIREMENT) OR LESSER AMOUNT IF SPECIFIED BY STATE

FIGURE 2 - Floodway Schematic

5.0 INSURANCE APPLICATION

For flood insurance rating purposes, flood insurance zone designations are assigned to a community based on the results of the engineering analyses. These zones are as follows:

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQ. FEET)	MEAN VELOCITY (FEET/SEC.)	REGULATORY (FEET NGVD)	WITHOUT FLOODWAY (FEET NGVD)	WITH FLOODWAY (FEET NGVD)	INCREASE (FEET)
SANDUSKY RIVER								
A	12,250	505	4172	8.1	691.3	691.3	691.6	0.3
B	14,510	360	4014	8.4	695.3	695.3	696.2	0.9
C	16,910	336	3737	9.0	700.2	700.2	701.0	0.8
D	20,750	291[2]	3674	9.2	710.5	710.5	710.8	0.3
E	43,300	683	7464	4.2	745.6	745.6	745.9	0.3
F	45,100	477	7134	4.4	746.1	746.1	746.5	0.4
G	46,900	345	6291	5.0	747.3	747.3	747.8	0.5
H	48,490	711	9388	3.4	747.8	747.8	748.3	0.5
I	73,000	446	7866	3.3	760.5	760.5	760.8	0.3
J	76,030	729	8503	3.1	761.0	761.0	761.4	0.4
K	81,000	715	11,403	2.3	761.6	761.6	762.1	0.5
L	84,900	315	6114	4.3	763.3	763.3	763.9	0.6
M	87,660	453	9191	2.8	763.9	763.9	764.6	0.7
N	92,480	942	12,297	2.1	764.5	764.5	765.2	0.7
O	96,500	268	5732	4.5	764.9	764.9	765.7	0.8

[1]FEET ABOVE CONFLUENCE OF SPICER CREEK
[2]THIS WIDTH EXTENDS WITHIN AREA NOT INCLUDED

TABLE 2

FEDERAL EMERGENCY MANAGEMENT AGENCY

SENECA COUNTY, OHIO
(UNINCORPORATED AREAS)

FLOODWAY DATA

SANDUSKY RIVER

Zone A

Zone A is the flood insurance rate zone that corresponds to the 100-year floodplains that are determined in the Flood Insurance Study by approximate methods. Because detailed hydraulic analyses are not performed for such areas, no base flood elevations or depths are shown within this zone.

Zone AE

Zone AE is the flood insurance rate zone that corresponds to the 100-year floodplains that are determined in the Flood Insurance Study by detailed methods. Whole-foot base flood elevations derived from the detailed hydraulic analyses are shown at selected intervals within this zone.

Zone X

Zone X is the flood insurance rate zone that corresponds to areas outside the 100-year floodplain, areas of 100-year flooding where average depths are less than 1 foot, areas of 100-year flooding where the contributing drainage area is less than 1 square mile, and areas protected from the 100-year flood by levees. No base flood elevations or depths are shown within this zone.

6.0 FLOOD INSURANCE RATE MAP

The Flood Insurance Rate Map is designed for flood insurance and floodplain management applications.

For flood insurance applications, the map designates flood insurance rate zones as described in Section 5.0 and, in the 100-year floodplains that were studied by detailed methods, shows selected whole-foot base flood elevations or average depths. Insurance agents use the zones and base flood elevations in conjunction with information on structures and their contents to assign premium rates for flood insurance policies.

For floodplain management applications, the map shows by tints, screens, and symbols the 100- and 500-year floodplains, the floodways, and the locations of selected cross sections used in the hydraulic analyses and floodway computations.

7.0 OTHER STUDIES

The COE studied the need for the construction of flood protection measures in the Sandusky River Basin and determined that no such construction was necessary within Seneca County as of the date of the study (Reference 11).

Flood Insurance Studies published for Sandusky County (Reference 12), the Cities of Fostoria and Tiffin, (References 13 and 9) and the Village of Green Springs, Ohio (Reference 14) are in agreement with this study. However, the profiles for the Sandusky River downstream of Huss Street in the City of Tiffin were recalculated using more recent field data during the preparation of the Seneca County study. The new elevations for this segment do not agree with those shown in the City of Tiffin Flood Insurance Study.

Flood Insurance Rate Maps printed for Wyandot County and the Village of Bettsville, Ohio (References 15 and 16) are in agreement with this study.

The Flood Insurance Study in progress for Hancock County, Ohio (Reference 17) is in agreement with this study.

A revision to the published Flood Insurance Study for Wood County, Ohio (Reference 18), in progress, is in agreement with this study.

This Flood Insurance Study supersedes the previously printed Flood Hazard Boundary Map for Seneca County (Reference 1).

8.0 LOCATION OF DATA

Information concerning the pertinent data used in the preparation of this study can be obtained by contacting the Natural and Technological Hazards Division, FEMA, 175 West Jackson Boulevard, 4th Floor, Chicago, Illinois 60604-2698.

9.0 REFERENCES AND BIBLIOGRAPHY

1. U.S. Department of Housing and Urban Development, Federal Insurance Administration, Flood Hazard Boundary Map, Seneca County, Unincorporated Areas, Ohio, June 1978.

2. U.S. Department of Commerce, Bureau of the Census, 1980 Census of Population, Number of Inhabitants, Ohio, Washington, D.C., February 1982.

3. ————, National Oceanic and Atmospheric Administration, Climate of the States, 1974.

4. U.S. Army Corps of Engineers, Special Flood Hazard Evaluation Report, Sandusky River, City of Tiffin, Seneca County, Ohio, October 1974.

5. U.S. Department of the Interior, Geological Survey, Interagency Advisory Committee on Water Data, Office of Water Coordination, Hydrology Subcommittee, Bulletin No. 17B, Guidelines for Determining Flood Flow Frequency, September 1981, revised March 1982.

6. U.S. Army Corps of Engineers, Irondequoit Creek Watershed, Final Feasibility Report, Appendix C, March 1982.

7. Kucera & Associates, Topographic Map of City of Tiffin, Ohio, Scale 1:2400, Contour Interval 2 Feet, April 1961.

8. U.S. Department of the Interior, Geological Survey, 7.5 Minute Series Topographic Maps, Scale 1:24000, Contour Interval 5 Feet: Tiffin South, 1960, photorevised 1972.

9. Federal Emergency Management Agency, Flood Insurance Study, City of Tiffin, Seneca County, Ohio, July 1986.

10. U.S. Army Corps of Engineers, Hydrologic Engineering Center, HEC-2 Water Surface Profiles, Computer Program 723-X6-L202A, Davis, California, 1974.

11. Federal Emergency Management Agency, Sandusky River Basin - Draft Final Feasibility Report, Buffalo, New York, September 1988.

12. ————, Flood Insurance Study, Sandusky County, Unincorporated Areas, Ohio, January 1979.

13. ————, Flood Insurance Study, City of Fostoria, Hancock, Seneca, and Wood Counties, Ohio, July 1987.

14. ————, Federal Insurance Administration, Flood Insurance Study, Village of Green Springs, Sandusky and Seneca Counties, Ohio, August 1980.

15. ————, Flood Insurance Rate Map, Wyandot County, Unincorporated Areas, Ohio, September 1987.

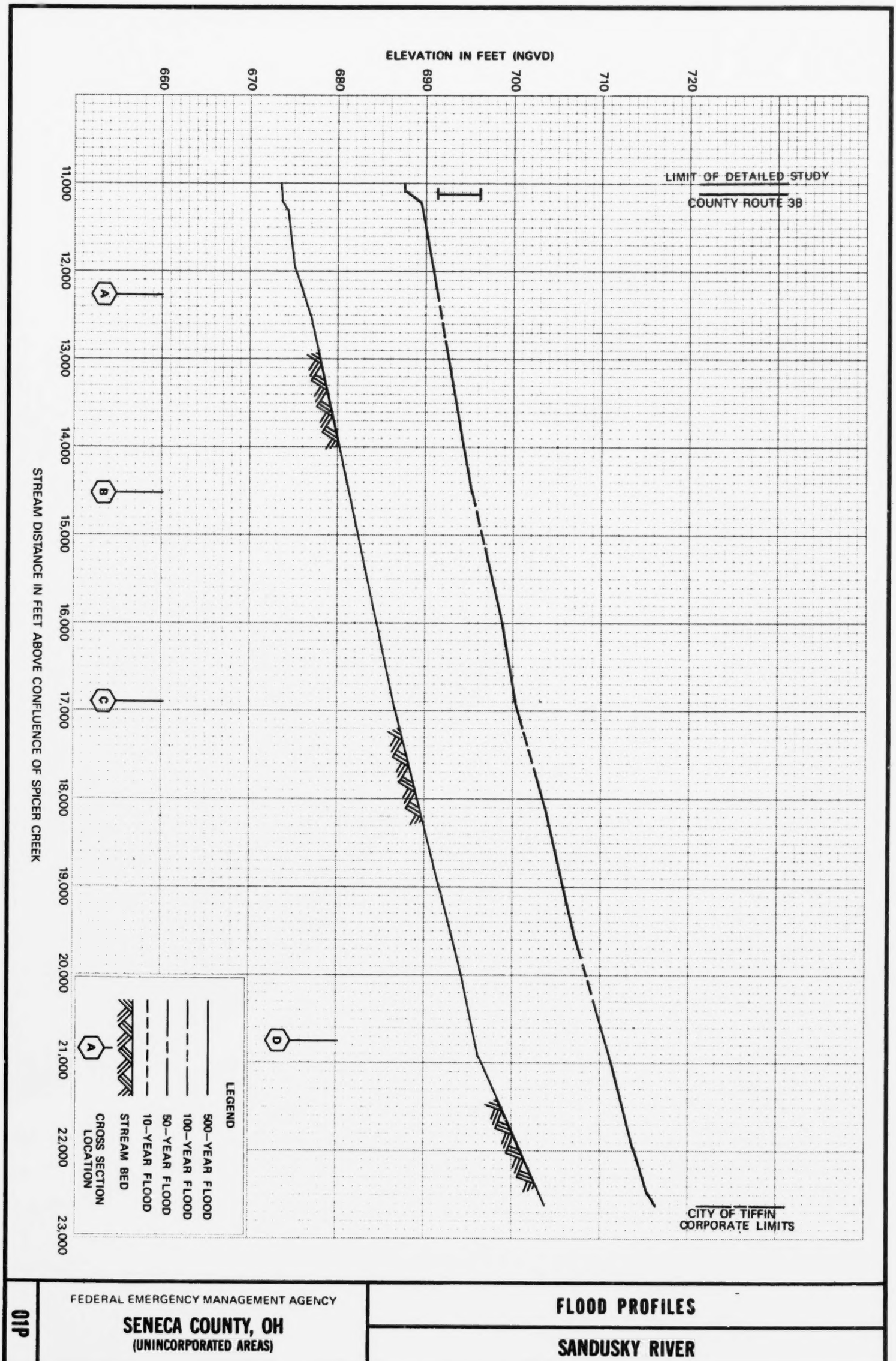
16. ————, Flood Insurance Rate Map, Village of Bettsville, Seneca County, Ohio, September 1988.

17. ————, Flood Insurance Study, Hancock County, Unincorporated Areas, Ohio, in progress.

18. ————, Flood Insurance Study, Wood County, Unincorporated Areas, Ohio, January 1984, revision in progress.

ELEVATION REFERENCE MARKS

REFERENCE MARK	FLOOD INSURANCE RATE MAP PANEL	ELEVATION (FEET NGVD)	DESCRIPTION OF LOCATION
1	0040	693.89	chiseled cross on top of downstream abutment of County Route 38 bridge over the Sandusky River
2	0085	747.06	chiseled cross on extreme downstream end of west abutment of U.S. Route 224 bridge over the Sandusky River
3	0095	765.09	chiseled cross on top of upstream east abutment of St. John's Bridge Road bridge over the Sandusky River



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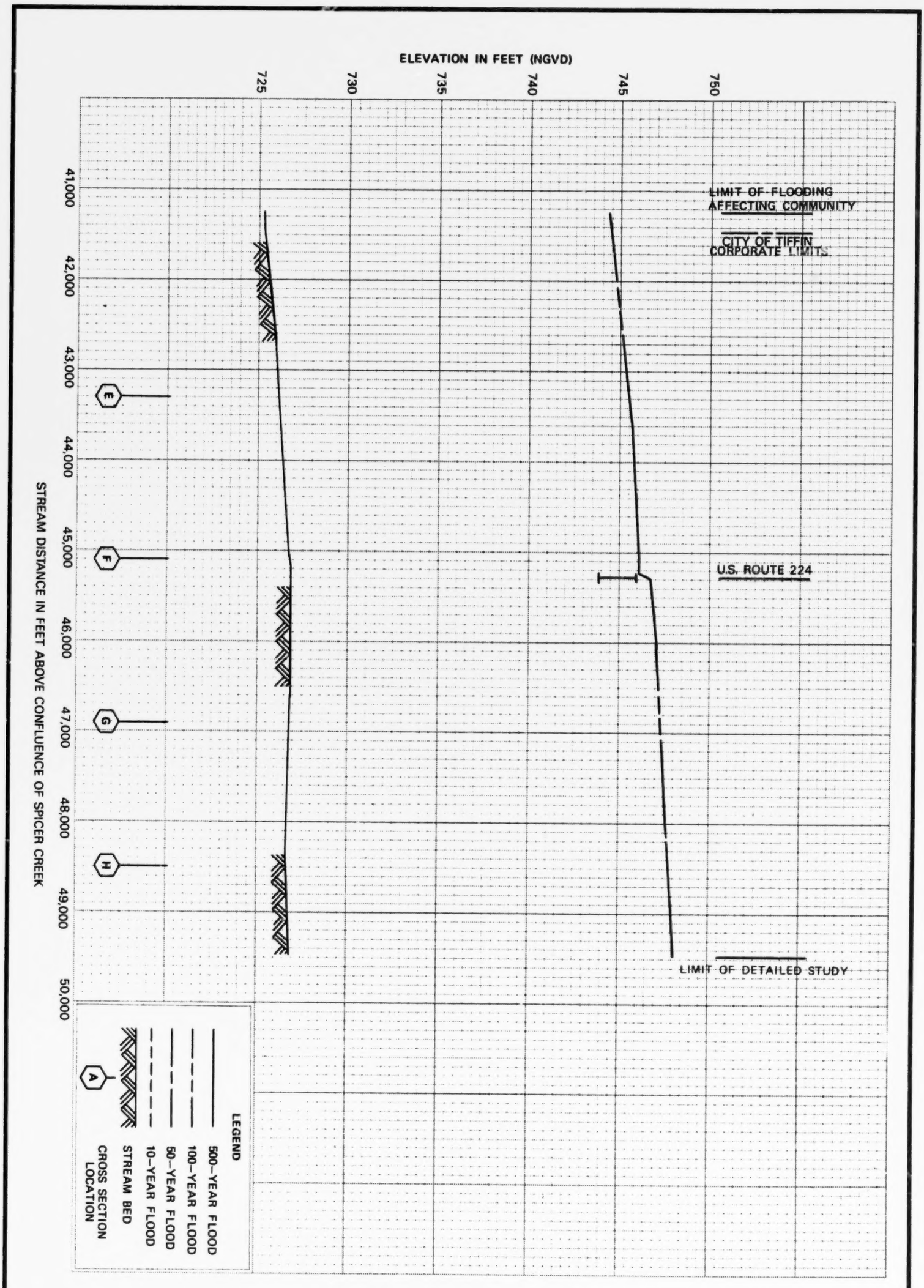
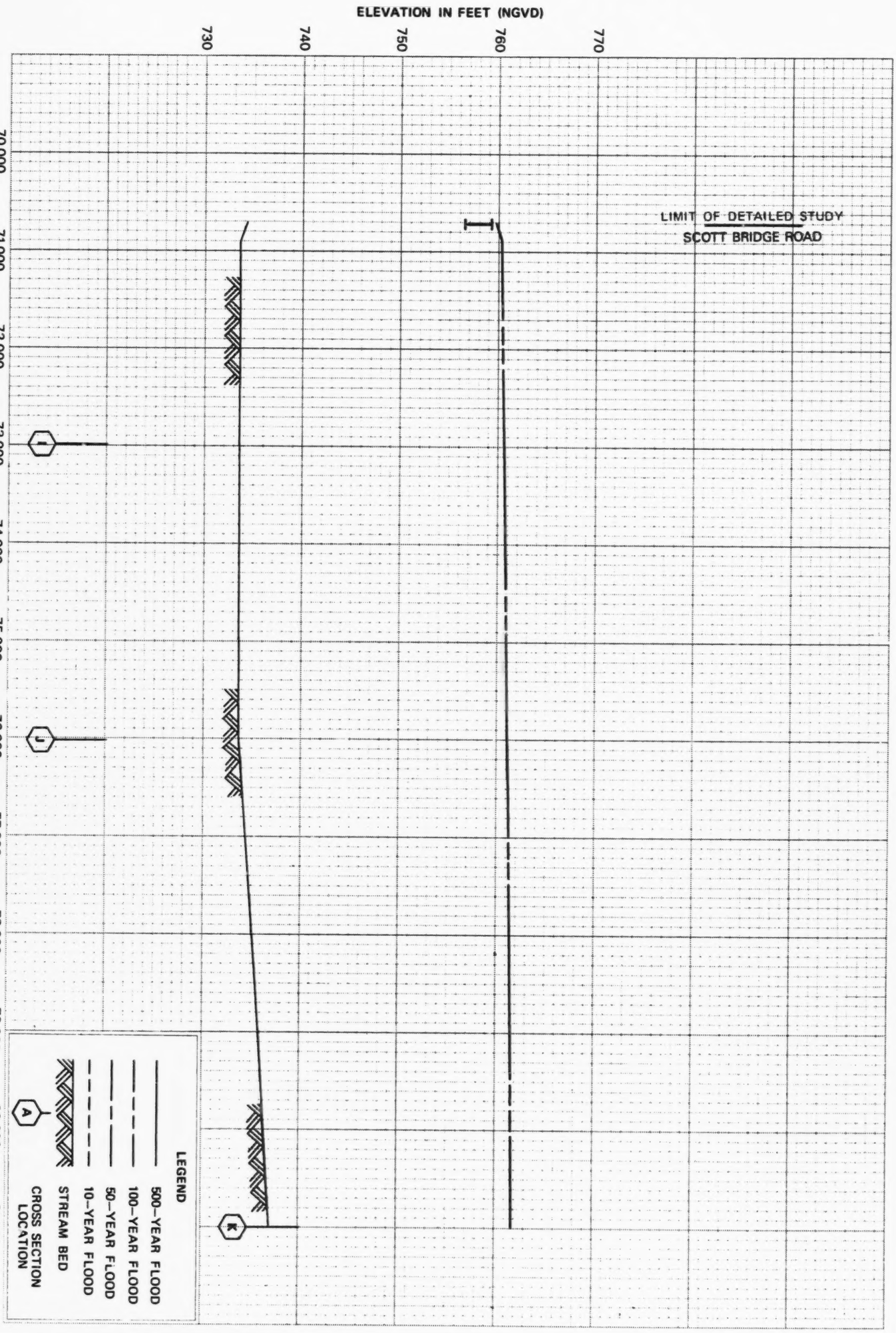
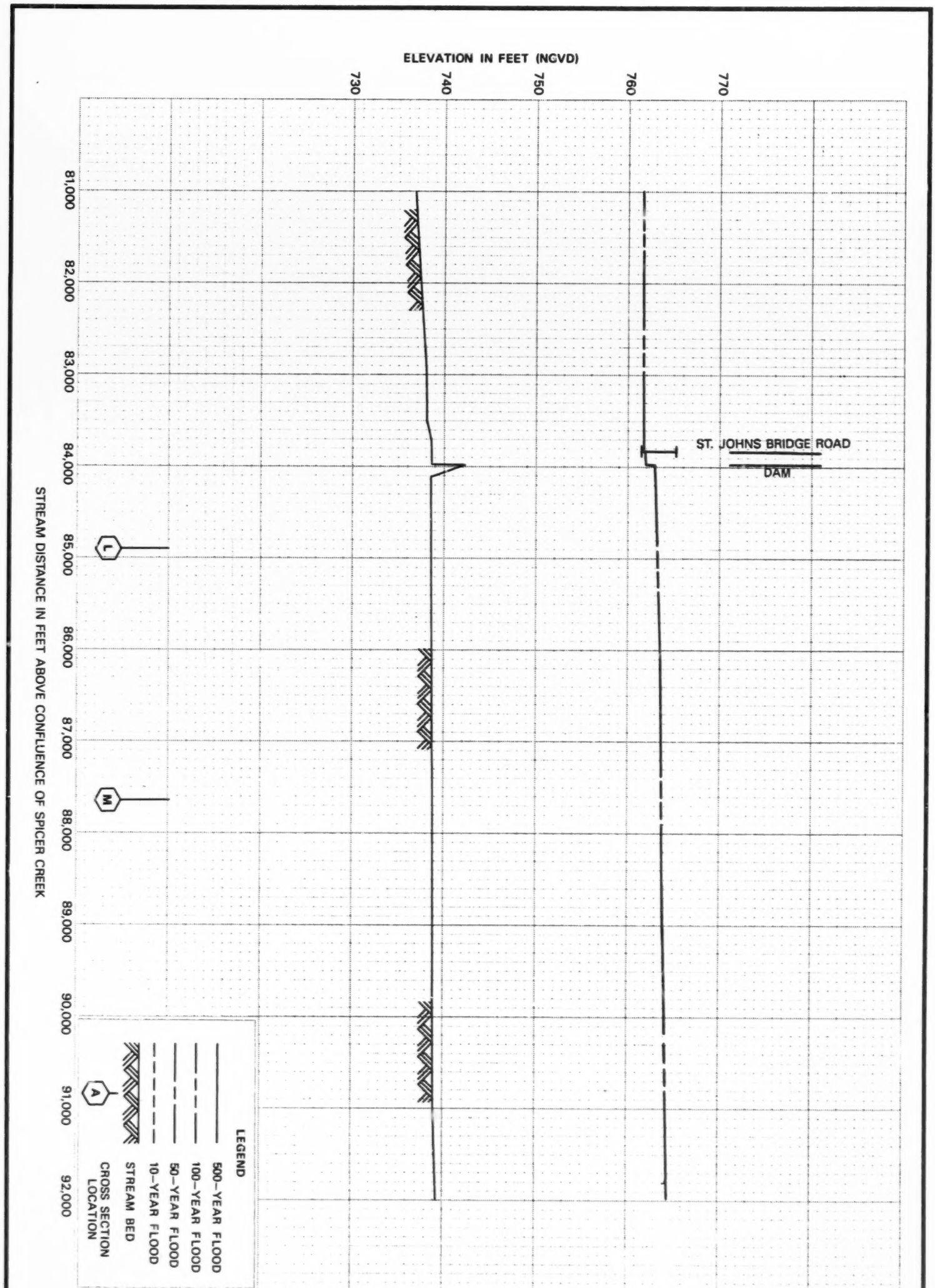
01P	FEDERAL EMERGENCY MANAGEMENT AGENCY **SENECA COUNTY, OH** **(UNINCORPORATED AREAS)**	**FLOOD PROFILES** **SANDUSKY RIVER**



02P	FEDERAL EMERGENCY MANAGEMENT AGENCY **SENECA COUNTY, OH** (UNINCORPORATED AREAS)	**FLOOD PROFILES** **SANDUSKY RIVER**



03P	FEDERAL EMERGENCY MANAGEMENT AGENCY **SENECA COUNTY, OH** (UNINCORPORATED AREAS)	**FLOOD PROFILES** **SANDUSKY RIVER**



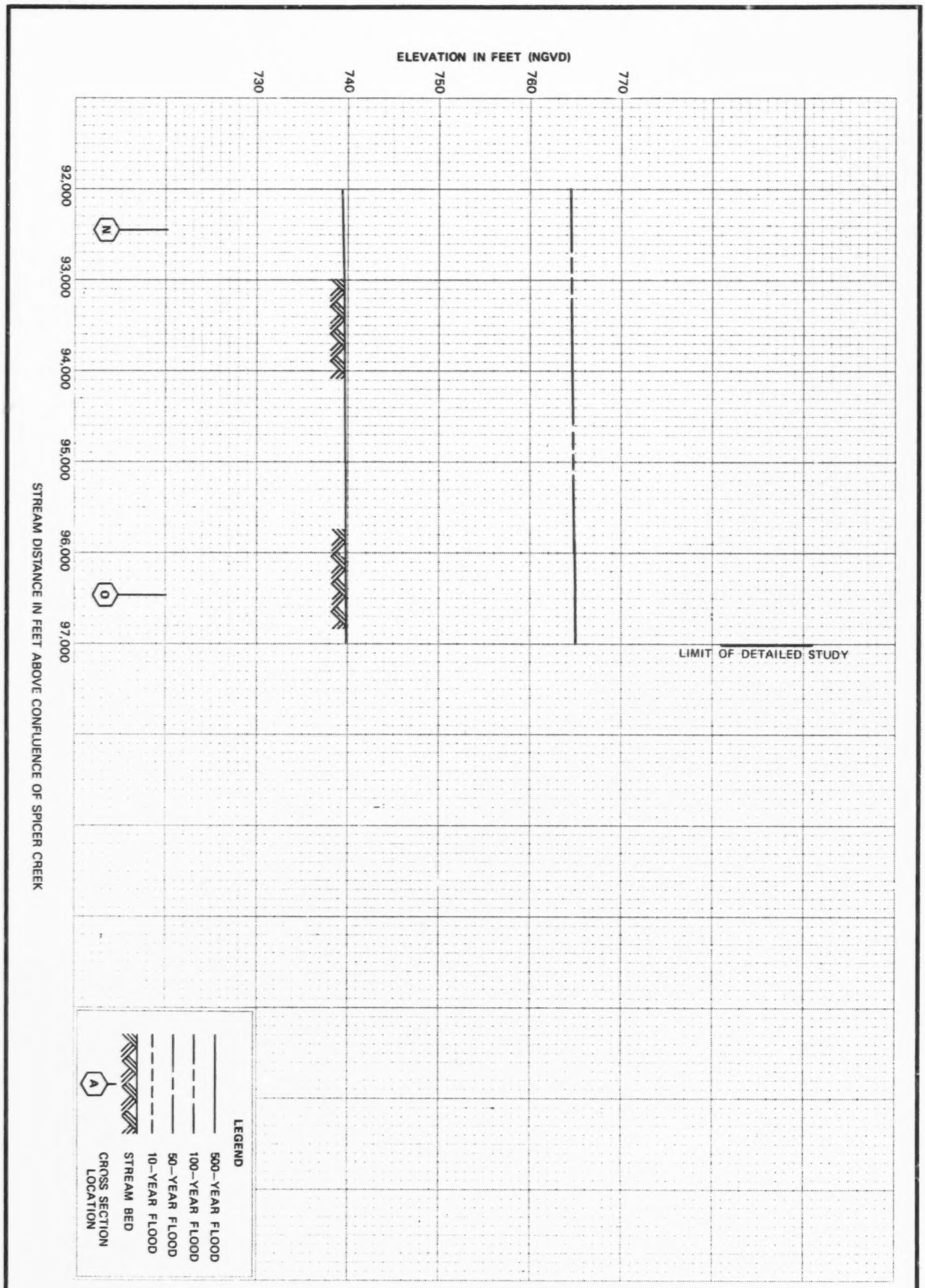
04P

FEDERAL EMERGENCY MANAGEMENT AGENCY

SENECA COUNTY, OH
(UNINCORPORATED AREAS)

FLOOD PROFILES

SANDUSKY RIVER



05P

FEDERAL EMERGENCY MANAGEMENT AGENCY

SENECA COUNTY, OH
(UNINCORPORATED AREAS)

FLOOD PROFILES

SANDUSKY RIVER